Integration of transcriptomic and proteomics approaches in characterizing short-term gravi-perception signaling networks in poplar wood.

Nicolas N. Richet, Mélanie Mauriat, Marie-Claude Lesage Descauses, Odile Rogier, Françoise F. Laurans, Stéphanie Huguet, Sandrine Balzergue, Nicolas N. Lapalu, Gilles G. Pilate, Catherine Coutand, et al.

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Richet N[1], Mauriat M[2], Lesage-Descauses M-C[1], Rogier O[1], Laurans F[1], Huguet S[3], Balzergue S[3], Lapalu N[4], Pilate G[1], Coutand C[5], Plomion C[2], Leple J-C[1]

[1]INRA, UR0588 AGPF, F-45075 Orléans cedex
[2]INRA, UMR 1202 BIOGECO, F-33610 Cestas, France
[3]INRA, UMR 9213/UMR1403 IPS2, F-91057 Evry Cedex, France
[4]INRA, UR1164 URGI, F-78026 Versailles, France
[5]INRA, UMR 547 PIAF, F-63100, Clermont-Ferrand, France
Jean-Charles.Leple@orleans.inra.fr

Summary

Plants organs are capable of sensing directional environment stimulus such as light, gravity, water availability and touch. Light and gravity are two of the most important environmental factors affecting plant stem growth and development. During the past 10-15 years, advances in our understanding of the molecular sensing and signaling actors in response to these stimuli have been mainly made in model annual plant. The goal of our study was to decipher the early molecular events operating in poplar wood stem submitted to changes in gravi-stimulation and so, prone to tension wood formation. As light and gravity early signaling may modulate each other we tilted plants in specific isotropic lightening devices enabling to ensure growth but triggering no directional phototropic signal (Fig. 1; Coutand et al., unpublished). Through RNAseq transcriptome profiling, proteomic and phosophoproteomic we identified candidates of the early signaling pathway of tension wood formation in poplar. Prominently, one receptor-like kinase is identified by the different approaches and appears as a good candidate for gravi and/or mechanical signaling. Moreover, several MAP kinases are also identified and could participate to this signaling network. Predicted gene network signaling models will be presented and discussed. This work was supported by the French ANR (project "TROPIC", ANR-11-BSV7-0012).

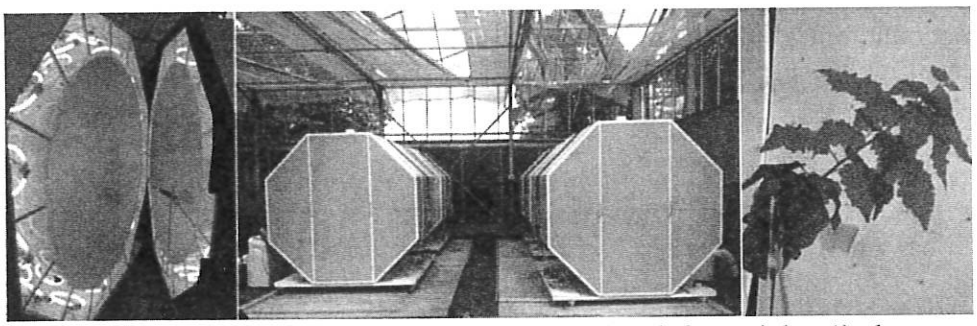

Fig. 1: Isotropic light illumination system. Going left to right: 1) the two hemispheres with their white circle neon lights and the sample attaching device, 2) the four modules used in this study placed in a greenhouse, 3) poplar plant fixed on the attaching device. Photograph courtesy of Richet N.

References

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